IWATSU

INSTRUCTION MANUAL

PROBE

1028 / 1029
1030 / 1031

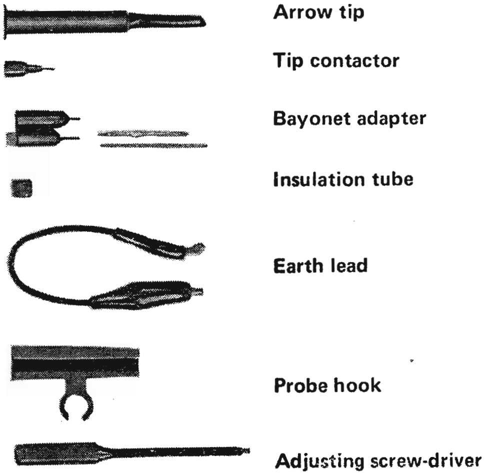
PROBE

1028 / 1029
1030 / 1031

Nov. '73

1028B 1 (B 2)
1030B 1 (B 2)

1029B 1 (B 2)
1031B 1 (B 2)



Accessories

1. GENERAL

Probes 1028/1029/1030/1031 are passive probes having attenuation ratio of 10:1. The synchroscope which can be used with these probes is those having input resistance of 1 MΩ.

Probe 1028/1029 can be applied to a synchroscope having an input capacitance of 12 to 16 pF, with a physical length of 1 m in case of 1028, or 2 m in case of 1029.

Probe 1030/1031 can be applied to a synchroscope having an input capacitance of 17 to 25 pF, with a physical length of 1 m in case of 1030, or 2 m in case of 1031.

Since these probes are usually used with a dual-trace synchroscope, a part except for the cable section is colored for channel identification. Those with slate gray is type B1 and those with warm gray is type B2.

2. COMPOSITION

- Probe
- Accessories
  - Arrow tip
  - Tip connector
  - Bayonet adapter
  - Insulator tube
  - Earth lead
  - Probe hook
  - Adjustment screwdriver
  - Accessory bag
  - Probe bag
  - Instruction manual

3. PERFORMANCE

	1028/1029	1030/1031
Input RC:	1028 R:10M ± 2%, C: 8.5pF ± 1.5pF 1029 R:10M ± 2%, C:11.5pF ± 1.5pF	1030 R:10M ± 2%, C: 9.5pF ± 1.5pF 1031 R:10M ± 2%, C:15pF ± 1.5pF
Attenuation ratio:	10 : 1 ± 3%	10 : 1 ± 3%
Frequency bandwidth:	When combined with SS-6300; 1028 300MHz - 3 dB 1029 300MHz - 4 dB When combined with SS-6200; 1028 200MHz - 3 dB 1029 200MHz - 3.5 dB When combined with SS-6100; 1028 100MHz - 3 dB 1029 100MHz - 3.5 dB	When combined with SS-6050; 1030 50 MHz - 3 dB 1031 50MHz - 3.5 dB
Square wave characteristic:	Overshoot 3 % Ringing 3 % Rounding 3 % Sag 3 % Matching distortion 5 %	Overshoot 3 % Ringing 3 % Rounding 3 % Sag 3 % Matching distortion 5 %
Maximum allowable input voltage:	600 V (DC + peak AC)	600 V (DC + peak AC)
Cable length:	1028 Approx. 1 m 1029 Approx. 2 m	1030 Approx. 1 m 1031 Approx. 2 m
Connector:	BNC	BNC
Input capacitance of applicable synchroscope:	12 to 16 pF	17 to 25 pF

4. OPERATION

Advantage of using probe:

In usual measurement using a synchroscope except for that under the input impedance of 50 , the signal is applied by using a probe. The use of probe not only facilitates the signal connection but also gives following advantages.

(1) The input impedance becomes high and the load effect for signal source can be alleviated.

(2) The interference from the devices other than the signal source can be removed.

(3) The maximum allowable input voltage can be increased up to 600 V (DC + peak AC). (The maximum allowable input voltage of synchroscope is 500 V (DC + peak AC)).

Precaution:

(1) Since the maximum allowable input voltage of probe is 600 V (DC + peak AC), never apply the voltage higher than this voltage.

(2) Since the input signal to the synchroscope is attenuated up to 1/10 when the probe is used, the sensitivity viewed from the probe head is also reduced to 1/10. Thus, the signal amplitude becomes that 10 times the setting value of the VOLTS/CM switch of the synchroscope.

(3) When measuring the signal having high frequency component, use the accessory earth lead or bayonet adapter and ground it at the area closest to the measuring point.

(4) Before measurement, adjust the phase of the probe without fail. Otherwise, erroneous measurement of the waveform may be developed.

Phase adjustment procedures:

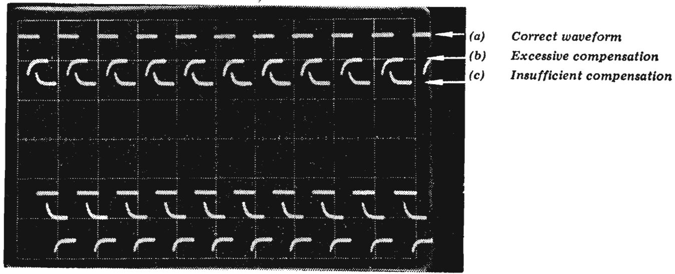
(1) Connect the probe connector to the INPUT connector of the synchroscope and the probe head, to the CAL OUT connector.

(2) Set the VOLTS/CM switch of the synchroscope to 50 mV range and the CALIBRATOR switch to the 2 V range.

(3) Trigger the synchroscope so that the Cal waveform having 4 cm amplitude will be displayed on the CRT.

(4) Slightly rotate the variable capacitor for phase adjustment in the matching box (connector side of the prove) with an adjustment screwdriver until the correct waveform as shown in Fig. 1 can be obtained.

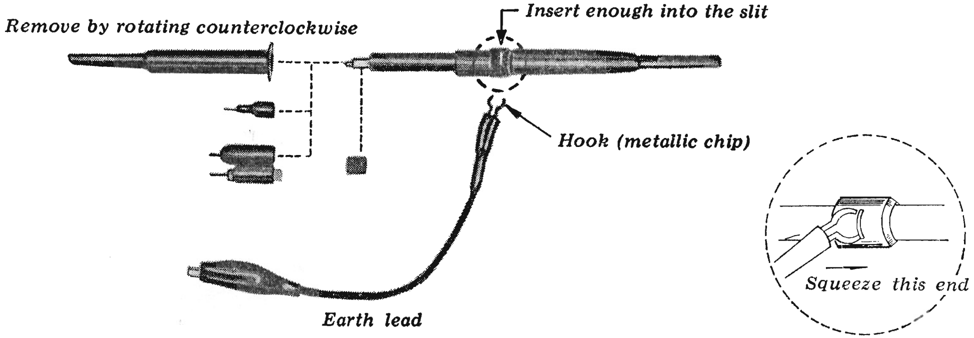
Fig. 1 Probe phase waveform



Use of accessories:

Arrow tip	Pull the flange toward the cable section and suspend the probe to the measuring point.
Tip connector	Use this tip for measurement of narrower space.
Bayonet adapter	Use this adapter when the measuring signal frequency component exceeds approx. 30 MHz. A long and short spare ground pin are provided for exchange.
Insulator tube	Used to insulate the exposed metallic part of the probe, when using the tip connector or the probe is used directly without accessories.
Earth lead	This is used to assure positive ground in common of the signal source and the synchroscope. Insert the hook enough into the slit of the rubber of the probe.
Probe hook	It should be fixed on the matching box of the probe and the probe head can hang over it when the probe is not used.

Fig. 2 Use of accessories


Remove by rotating counterclockwise
Insert enough into the slit
Hook (metallic chip)
Squeeze this end
Earth lead

5. CHECK AND CALIBRATION OF SQUAREWAVE CHARACTERISTIC

Any abnormarity of the squarewave characteristic may cause erroneous measurement during signal observation of high frequency component. Therefore, periodical check is required. When abnormarity is found, as a result of check, immediate calibration is also important.

Measuring instruments and accessories:

Pulse Generator

Rise time:	1028/1029	300 ps or less
	1030/1031	500 ps or less
Output voltage:	0 to 1 Vp-p	
Pulse width:	300 ns or more	
Waveform distortion:	As small as possible	

(Example) Pulse generator PG-10P/10N Iwatsu

Standard Signal Generator

Frequency bandwidth:	1028/1029	50 kHz to 300 MHz or more
	1030/1031	50 kHz to 50 MHz or more
Output voltage:	10 mV to 1 V	

Synchroscope

Frequency bandwidth:	1028/1029	300 MHz
	1030/1031	50 MHz
Input capacitance:	1028/1029	12 to 16 pF
	1030/1031	17 to 25 pF
(Example)	1028/1029	SS-6300
	1030/1031	SS-6050

50 Ω coaxial cable		
50 Ω termination	(Example)	BB50M1 Iwatsu
BNC-J adapter	(Example)	BNC-J adapter Iwatsu
50 Ω coaxial attenuator	(Example)	AA series Iwatsu

Note: When the output of the square wave generator is provided through the built-in attenuator and the voltage can vary over the range of 0 to 1 V, this 50Ω coaxial attenuator is not necessary.

Caution:

(1) All measuring instruments used should be calibrated accurately.

(2) The probe 1028/1029 is usually calibrated by using a synchroscope SS-6300, however, it is also possible to calibrate it with a synchroscope SS-6200 or SS-6100. In such a case, it should be noted that the overall performance of the probe and the SS-6300 is not guaranteed.

Check:

(1) Carry out prescribed phase adjustment.

(2) Set the controls of the synchroscope as follows.

VOLTS/CM	10mV/cm
VARIABLE	CALIB

(3) Connect between the synchroscope and the pulse generator as shown in Fig. 3.

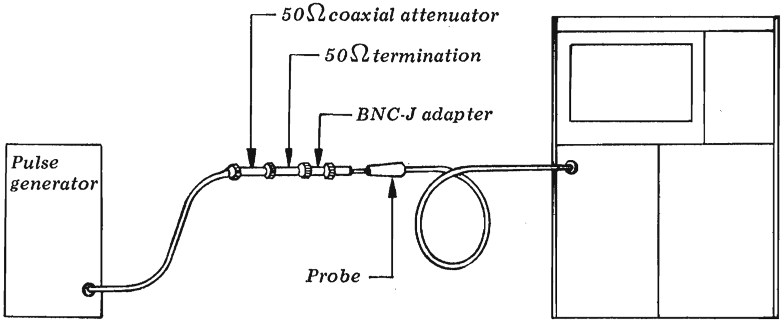
(4) Adjust the output of the pulse generator so that the vertical amplitude of the waveform displayed on the CRT becomes 4 to 5 cm. When the output is too high, use the 50Ω coaxial attenuator in order to reduce the output level to the adequate one.

(5) Reset the A TIME/CM switch of the synchroscope according to the pulse width, and check the square wave characteristic permitting the display as shown in Fig. 4.

(6) Remove the output from the pulse generator and connect the output from the standard signal generator instead. (Connection procedures conform to that in case of the pulse generator.)

(7) Change the setting of the A TIME/CM switch to the range of 1 ms/cm, and set the frequency of the standard signal generator to 10 MHz (1028/1029) or 100 kHz (1030/1031). Then, adjust the output of the standard signal generator so that the amplitude of the displayed waveform becomes 40 mm as shown in Fig. 5. Simultaneously, adjust the output level meter to the proper indication (0 dB in usual) and memorize it.

Fig. 3 Connection between probe and pulse generator

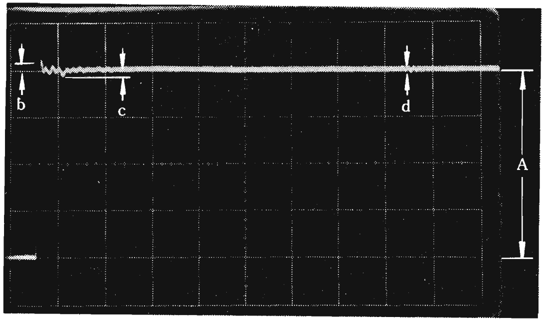


(8) Adjust the output frequency of the SG in accordance with the probe and synchroscope used.

1028/1029	In case of SS-6300;	300 MHz
	SS-6200;	200 MHz
	SS-6100;	100 MHz
1030/1031	In case of SS-6050;	50 MHz

Then, adjust the output level meter of the SG to the indication obtained in step (7). At this time, check the amplitude of the displayed waveform. The specified amplitude is 28.5 mm (-3 dB) or more in case of 1 m probe (1028/1030), or 27 mm (-3.5 dB) or more in case of 2 m probe (1029/1031) as shown in Fig. 5. (However, the amplitude should be more than 25.5 mm (-4 dB) when the 1029 and SS-6300 are combined.)

Fig. 4 **Measurement of squarewave characteristic**



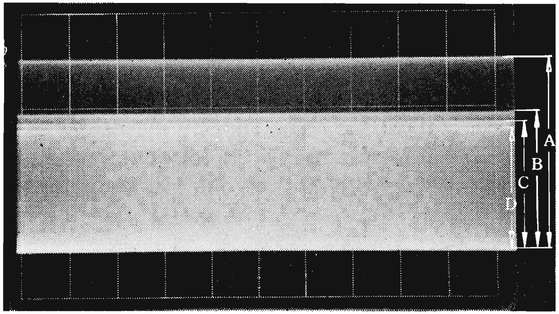
Overshoot : $\frac{b}{A}$

Ringing : $\frac{c}{A}$

Matching distortion : $\frac{d}{A}$

(9) When it is proved as a result of above check that either or both of the squarewave characteristic and the frequency bandwidth are out of the specification or when both of which should be upgraded, carry out following calibration.

Fig. 5 **Measurement of frequency bandwidth**



A: Amplitude at the lower limit frequency (40 mm)
B: Amplitude at the upper limit frequency (1 m probe) (28.5 mm or more)
C: Amplitude at the upper limit frequency (2 m probe) (27 mm or more)
C: Amplitude at the upper limit frequency (1029 + SS - 6300) (25.5 mm or more)

Calibration:

(1) Adjust the squarewave characteristic as follows in accordance with the probe to be calibrated.

1028

- a. Adjust the flatness by means of R2 and R4. (Refer to Fig. 6.)
- b. Adjust the rising edge by means of R3 and R5 (Refer to Fig. 6.) for obtaining sharp rising edge. At this time, the overshoot, ringing, and matching distortion should be made as small as possible.
- c. Repeat above adjustments for obtaining the best waveform.

1029

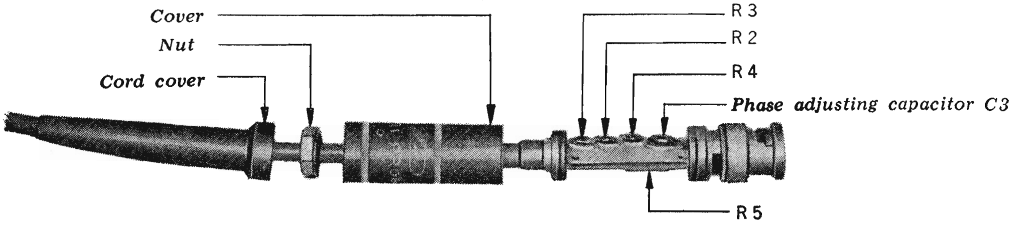
- a. Adjust the flatness by means of R2. (Refer to Fig. 6.)
- b. Adjust the rising edge by means of R3, R4 and R5 (Refer to Fig. 6.) for obtaining sharp rising edge. At this time, the overshoot, ringing, and matching distortion should be made as small as possible.
- c. Repeat above adjustments for obtaining the best waveform.

1030/1031

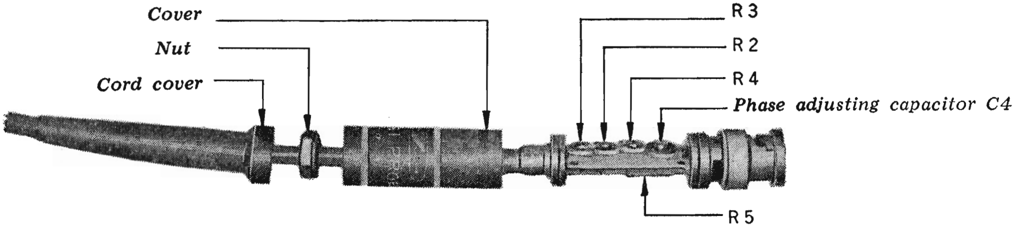
- a. Adjust the flatness by means of R2. (Refer to Fig. 7.)
- b. Adjust the rising edge by means of R3 and R4 (Refer to Fig.7.) for obtaining sharp rising edge. At this time, the overshoot, ringing and the matching distortion should be made as small as possible.
- c. Repeat above adjustments for obtaining the best waveform.

(2) Check the frequency bandwidth by the procedures prescribed above. If the characteristic is out of the specification, repeat the procedures in item (1). Thereafter, carry out the check again especially for sharp rising edge.

Fig. 6 Adapters for 1028/1029 Probes

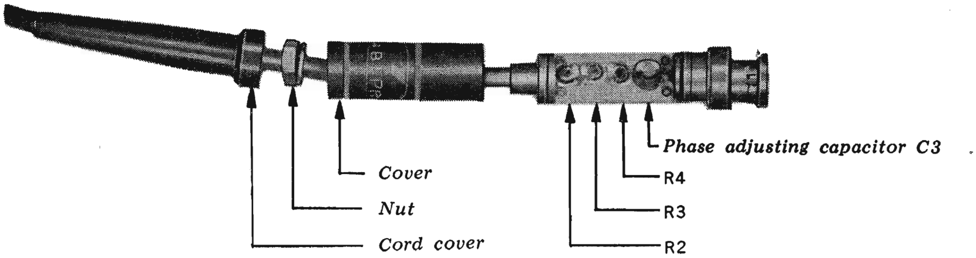


1028

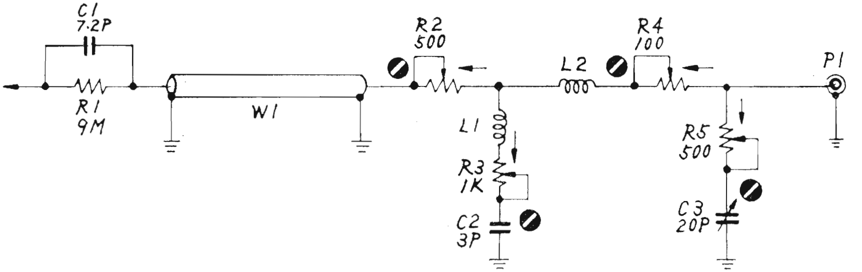


1029

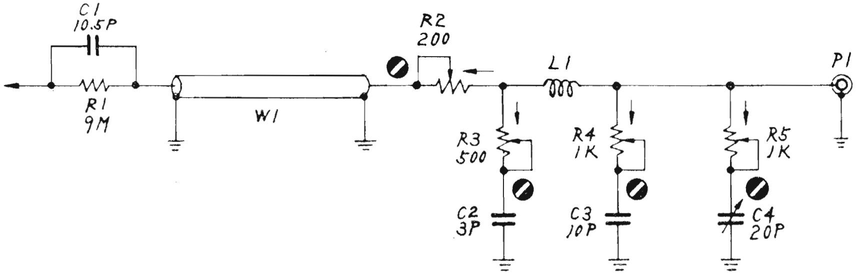
Fig. 7 Adapter for 1030/1031 Probes



SCHEMATIC DIAGRAM

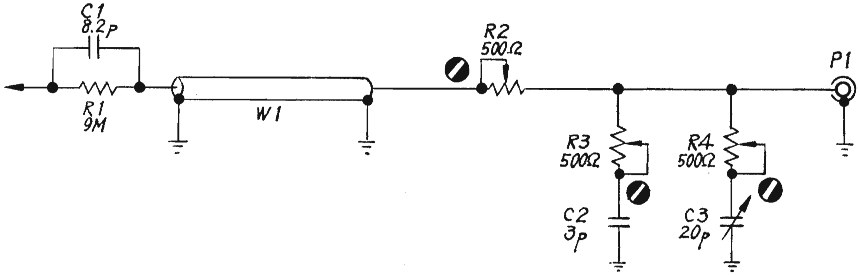


1028

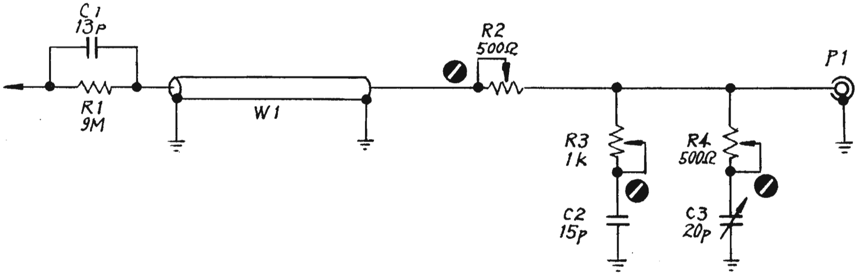


1029

SCHEMATIC DIAGRAM



1030



1031

MEMO

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